FIG. **2** is a perspective view of a door inner panel made according to the present invention;

FIG. **3** is perspective view of a door outer panel made according to the present invention;

FIG. **4** is a fragmentary schematic cross-sectional view showing a hem flange being formed by a roll forming tool on a door outer panel;

FIG. **5** is a fragmentary schematic cross-sectional view showing inner and outer door panels having an adhesive applied in the hem flange area prior to the final hemming operation; and

FIG. **6** is a fragmentary schematic cross-sectional view showing the outer door panel being hemmed to the inner panel by a roll hemming process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring to FIG. **1**, the process, generally indicated by reference numeral **10**, is illustrated by a flow chart. The process begins by super-plastic forming a door inner panel **14** as shown in FIG. **2**. After forming, the door inner panel **14** is trimmed at **16**. The trimming operation may be performed in two steps comprising a rough trim and a finished trim. The trimming operation may be performed by means of a laser trimming tool or by other trimming tools such as water jet cutting, routering or other mechanical shear or trimming tools.

In a parallel process a super-plastic forming operation is used to form the door outer panel **22** as illustrated in FIG. **3**. The door outer panel **22** is trimmed, at **24**, preferably with a laser trim tool, however, other methods of trimming may be used to form the outer panel **22** to its specified dimensions with a tolerance of 1 millimeter. A flange is formed preferably by a robotic roll forming machine at **26**. The flange is shown schematically in FIG. **4** and will be described more fully below. Next, the inner and outer door panels are assembled at **28** by placing them together. An epoxy adhesive is applied to the hem area at **32** and is illustrated schematically in FIG. **5**. A hem is formed by a robotic roll form operation at **34** and as illustrated by FIG. **6**. After hemming, the door assembly is electro-coated at **36** and the door assembly is then checked dimensionally at **38**. Finally, the door assembly is attached to a vehicle at **40**.

Referring to FIG. **2**, a door inner panel is shown and will be described in greater detail. The door inner panel **14** has a roof reinforcement section **42**, a window frame reinforcement section **44**, and a lower door reinforcement section **46**. The roof reinforcement section **42** extends partially across a roof area of the vehicle and is oriented at angle approximately 90° relative to the plane of the lower door reinforcement section **46**. The inner panel **14** includes a hinge attachment area **48** and a striker attachment area **50**. The door hinge is attached to the hinge attachment area **48** while the door latch and lock mechanism is attached to the striker attachment area **50**. The door inner panel is contoured to receive a scoop portion **66** of the outer panel **22** as described more specifically below.

The outer panel **22** includes a roof section **56**, a window frame section **58**, and a lower door section **60**. The roof section **56** and lower door section **60** extend in planes that are generally perpendicular to each other. The outer panel **22** also includes an outer panel hinge attachment area **62** and an outer panel striker attachment area **64** that combine with a hinge attachment area **48** and striker attachment area **50** of the inner door to provide a rigid mounting surface for the hinge and striker. The outer panel **22** defines a scoop **66** that funnels air to the rear engine compartment in the illustrated door. The scoop **66** is defined on its lower edge by an emergent feature line **68** that emerges from a flat portion of the door outer panel **22**. A continuous feature line **70** extends across the top of the scoop **66**.

Referring to FIG. **4**, the step of roll forming a flange on the outer panel **22** is illustrated. The flange is formed by engaging a peripheral flange **76** with a flange roll forming tool **78**. The flange **76** is roll formed to begin the process of forming a hem.

Referring to FIG. **5**, the inner door panel **14** and outer door panel **22** are illustrated with an adhesive **80** applied to a peripheral portion **82** of the inner panel **14**. The flange **76** of the outer panel **22** is shown extending approximately 90° relative to the plane of the outer door panel **22**. The adhesive **80** may be a room temperature curable two-part epoxy adhesive. By using a room temperature curable adhesive **80** the inner and outer door panels **14** and **22** may become securely locked together before further processing steps are performed on the door. In particular, the adhesive **80** is intended to cure fully before the door assembly is attached to the vehicle and well before the door assembly is heated in electro-coat or paint ovens.

Referring to FIG. **6**, the peripheral flange **76** of the outer door panel **22** is shown hemmed over the inner door panel **14**. The two-part epoxy adhesive **80** is shown between the peripheral flange **76** and the peripheral portion **82** of the inner panel **14**. (The thickness of the adhesive **80** as shown in FIG. **6** is exaggerated for purposes of illustration.) The peripheral flange **76** is formed with a reverse turn **84** by a hem roll forming tool **86**.

While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

What is claimed:

1. A method of making a vehicle door comprising:
- super-plastic forming an inner door panel;
- trimming the inner door panel;
- super-plastic forming an outer door panel;
- trimming the outer door panel;
- positioning a first surface of the inner door panel in contact with the outer door panel;
- forming a peripheral flange on the outer door panel after positioning the inner door panel;
- applying a two-part adhesive to a second surface of the inner door panel disposed opposite the first surface in areas adjacent the peripheral flange after forming the peripheral flange;
- hemming the peripheral flange over the inner door panel after applying the two-part adhesive and adhering the peripheral flange to the inner door panel with the two-part adhesive; and
- curing the two-part adhesive to lock the inner door panel and the outer door panel together.

2. The method of claim **1** further comprising applying an electro-coat layer to the inner door panel and to the outer door panel after the inner and outer door panels are assembled together.

3. The method of claim **1** wherein the two-part adhesive is a room temperature curable epoxy adhesive.

4. The method of claim **1** wherein the inner and outer door panels are formed from an aluminum alloy.

5. The method of claim **4** wherein the aluminum alloy is 5083 aluminum alloy.